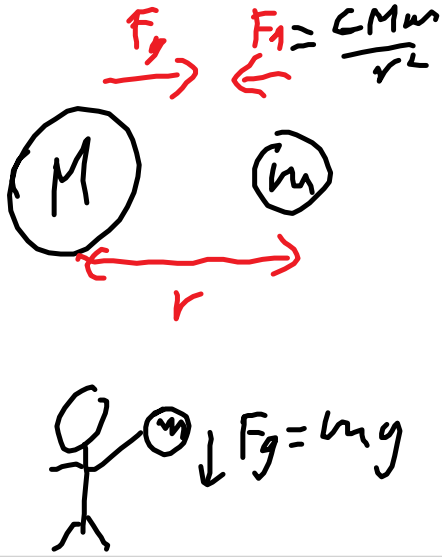
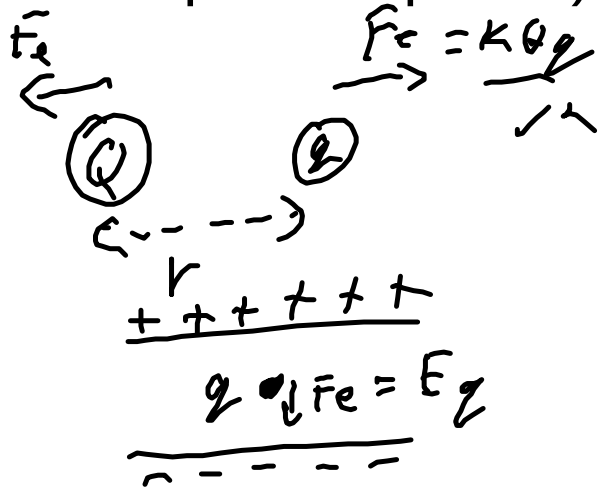
Final IA
Turnitin.com
ID: 16307795
key: Physics
due Sunday night before midnight

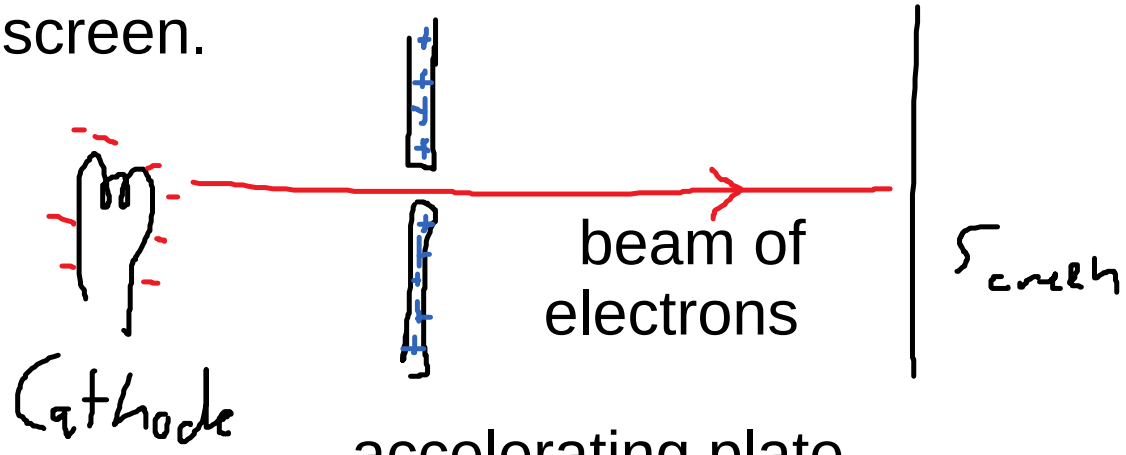
Electrostatics:

Gravity	Electrostatics
$F_g=GMm/r^2$ in general $F_g = mg$ in uniform field 	$F_e=kQq/r^2$ point charges $F_e=Eq$ uniform field (between parallel plates) 
$E_g = mgh$ in uniform field (HL)$E_g = -GMm/r$	electric potential energy $\Delta E_e = qEd$ where d is the displacement against the field (HL) $E_e = kQq/r$

gravitational potential, $V = E_g/m$ gravitational energy per unit mass in J/kg	Electric potential also called voltage, $V = E_e/q$ $\Delta V = Ed$ in a uniform field

Cathode Ray Tube, CRT

You have a metal plate at high voltage, positively charged, that pulls electrons off the cathode (negative wire) the beam goes through a hole in the high voltage plate and creates a dot on a screen.



eg. if the potential difference between the cathode and the accelerating plate is 700V,

a) what is the change in electrostatic energy of an electron going from the Cathode to the plate?
b) what is the velocity of the electron if all the energy goes the acceleration

charge of an electron, $e = 1.602 \times 10^{-19} C$

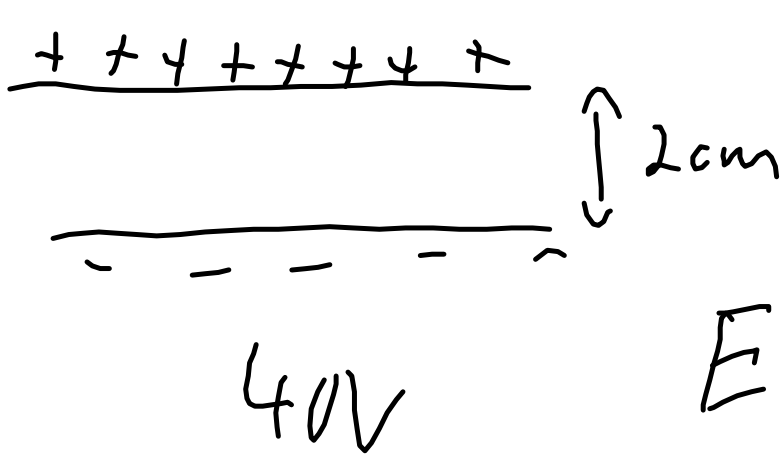
a)

$V=E_e/q$ so $E_e = Vq = 700V \times -1.602 \times 10^{-19}C$
$700 \times 1.602 = 1,121.4$
$= -1.12 \times 10^{-16} J$

b) Energy = $1/2\ mv^2$
$v = \sqrt{(2 \times energy/m)}$
mass the electron = 9.11×10^{-31} kg
v = Sqrt(2x1.12E-16/9.11E-31)=
1.56806774198971E7
1.57×10^7 m/s

After the electron is accelerated, it then can be deflected by electric or magnetic fields.

If you have two parallel plates with a potential difference of 40.0V that are 2.0 cm apart, what is the strength of the electric field between the plates? What is the force on an electron between the plates?

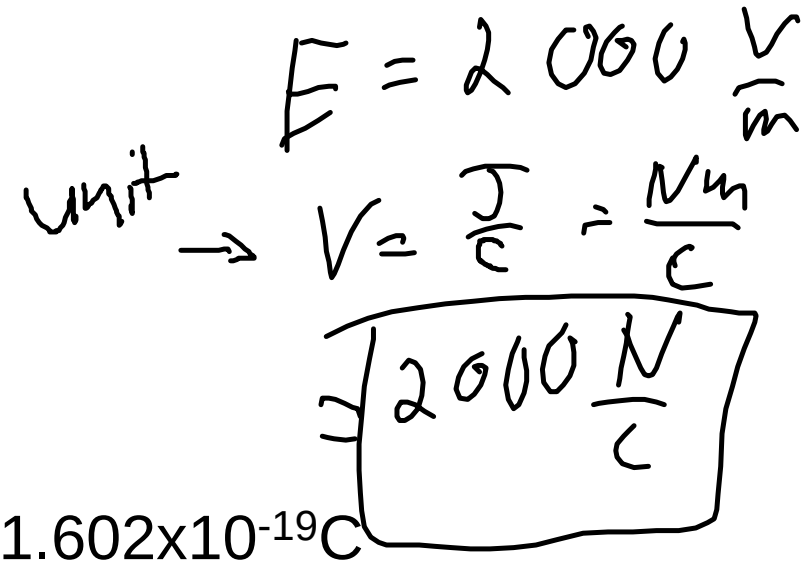


$V = Ed$

$E = \frac{V}{d}$

$E = \frac{40V}{0.02\ m}$

$E = 2000\ \frac{V}{}$



$F = Eq = 2000N/C \times 1.602 \times 10^{-19}C$
$= 3.2 \times 10^{-16}N$

E is electric field strength, F/q - vector
E_e is electro static energy - scalar

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